



NIST PROJECT ON STANDARD TERMINOLOGY FOR MICROWAVE RADIOMETRY

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uCal-2002, Barcelona, 11 Oct., 2002



Background: NIST RadCal Effort

- ◆ Traditional activities: noise standards (in coaxial lines & waveguide), noise temperature of noise sources. More recently, amplifier & transistor noise properties.
- ◆ Last year, began effort on radiometer calibration
 - internal funding for a few years (seed money)
 - joint effort between noise & antenna projects

◆ Activities:

- Standard Terminology Project Today
- Develop a standard, generic uncertainty analysis for total-power radiometers
- Antenna characterization
- ? Injection calibration service ?
- ? Standard targets, calibration service ?
- ? Target characterization ?

Standard Terminology Project General Plan

- ◆ Parallel and coordinated with the CEOS Working Group on Calibration & Validation (WGCV) Microwave Sensors Subgroup (MSSG), but 2 separate lists (at least for now).

◆ Will maintain website with

- Current list:
 - terms to be defined
 - proposed definitions
 - adopted definitions
- Input:
 - suggest terms
 - suggest definitions
 - comment of proposed definitions
- Related links.

◆ Website is up & running:

www.boulder.nist.gov/stdterms

◆ Sources:

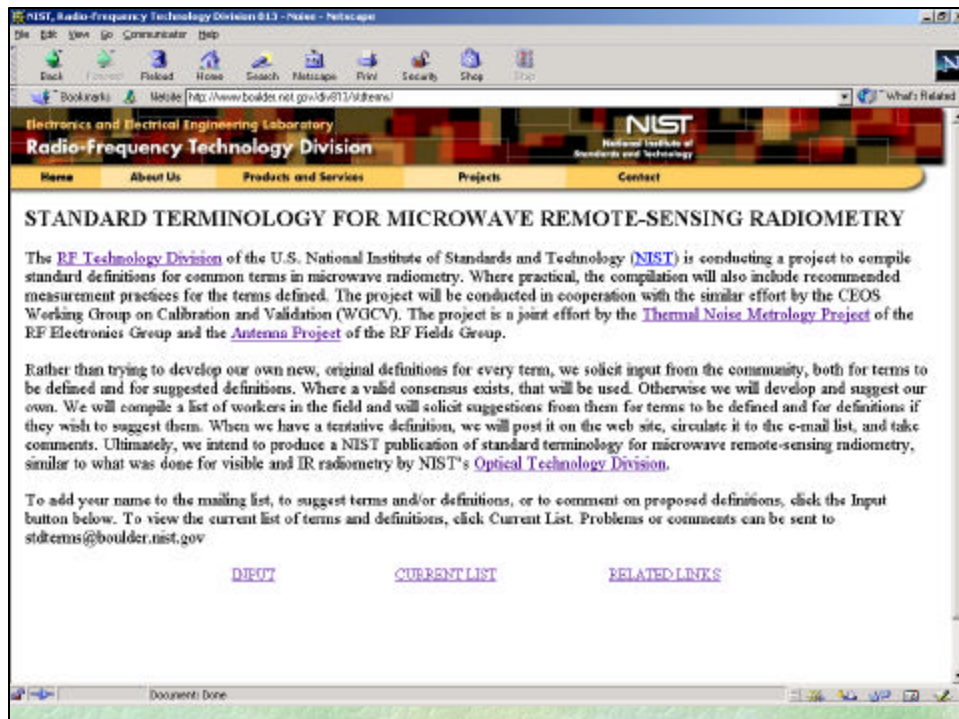
- Input from those in the field, from website or ...
- Standards:
 - International Vocabulary of Basic and General Terms in Metrology (IVM), ISO, 1993
 - Guide to the Expression of Uncertainty in Measurement (GUM), ISO, 1993
also NIST Tech. Note 1297, Taylor & Kuyatt, 1994.
 - Standard Dictionary of Electrical and Electronics Terms, IEEE, 1988.
 - Wyatt, Privalsky, & Datla, "Recommended Practice: Symbols, Units & Uncertainty Analysis for Radiometric Sensor Calibration," NIST Handbook 152, 1998.

◆ Sources (cont'd)

- Books: Ulaby, Moore, & Fung; Krause; Skou; Rees; ...
- CEOS WGCV MSSG List

◆ Philosophy/approach:

- Relevant or consistent with general usage in the microwave radiometry community.
- As far as possible, also consistent with the broader community (IVM, GUM).
- Possible extension to include recommended practices, if practical.



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REPLY FORM

E-mail Address:

Please add me to the e-mail list: ☐ Yes ☐ No

(The e-mail list will be used to notify interested parties of new proposed definitions.)

Comments: (suggested terms to be defined, suggested definitions, comments on proposed definitions, etc.)

For technical questions: webmaster@boulder.nist.gov Last revised: July 23, 2002

webmaster@boulder.nist.gov

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[Second International Microwave Radiometer Calibration Workshop \(ICMCR-2002\)](#)

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[CEOS \(Committee on Earth Observation Satellites\)](#)

[CEOS Working Group on Calibration and Validation](#)

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[European Space Agency \(ESA\)](#)

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PARTICULAR CASE:

- ◆ Error, uncertainty, accuracy, resolution, sensitivity, etc. (All from IVM &/or GUM)
- ◆ N.b.: These terms and definitions are also being suggested for CEOS list.

True value: value consistent with the definition of a given particular quantity.

Notes: This is a value that would be obtained by a perfect measurement. True values are by nature indeterminate.

Error: result of a measurement minus a true value of the measurand.

Notes: Since a true value cannot be determined, in practice a conventional true value is used. When it is necessary to distinguish “error” from “relative error,” the former is sometimes called the “absolute error.”

Uncertainty of measurement: parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the measurand.

Random error: result of a measurement minus the mean that would result from an infinite number of measurements of the same measurand carried out under repeatability conditions.

Notes: Random error is equal to error minus systematic error. Because only a finite number of measurements can be made, it is possible to determine only an estimate of random error.

Systematic error: mean that would result from an infinite number of measurements of the same measurand carried out under repeatability conditions minus a true value of the measurand.

Notes: Systematic error is equal to error minus random error. Like true value, systematic error and its causes cannot be completely known. For a measuring instrument, see “bias.”

Accuracy: closeness of the agreement between the result of a measurement and a true value of the measurand.

Notes: "Accuracy" is a qualitative concept. The term "precision" should not be used for accuracy.

Resolution: smallest difference between values of a measurand that can be meaningfully distinguished. [modified IVM]

Sensitivity: change in the response of a measuring instrument divided by the corresponding change in the stimulus.

Discrimination (threshold): largest change in a stimulus that produces no detectable change in the response of a measuring instrument, the change in the stimulus taking place slowly and monotonically.



- ◆ Note: possible inclusion of such terms as radiometric sensitivity, radiometric accuracy, ...
- ◆ List is currently in early stages. Many terms (& their definitions) still to be added.
- ◆ Chapters I (General Terminology) and II (Real-Aperture Radiometers) of CEOS MSSG list will also be posted on website.
- ◆ Input to website will be considered for CEOS MSSG effort as well as for NIST list.

Accepting (Constructive) Suggestions:

- ◆ Useful directions or tasks
- ◆ Standard Terminology: terms, definitions, references.

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